REMARKS

Claims 1-20 are currently pending in the application. By this amendment, claim 1 is amended for the Examiner's consideration. Figures 2, 9 and 22 are revised. Reconsideration of the rejected claims in view of the above amendments and the following remarks is respectfully requested.

Allowed Claims

Applicants note that none of the claims were rejected in view of prior art. In view of this fact, Applicants submit that the claims contain allowable subject matter and should be passed to issuance upon overcoming the objection to the drawings and the 112, 1st and 2nd paragraph rejections. As the objection and 112, 1st and 2nd paragraph rejections should now be withdrawn, in view of the below comments, Applicants submit that all of the claims are in condition for allowance.

Objection to Drawings

The drawings were objected to for not including certain reference numerals. Figures 2, 9 and 22 are amended to address the issues presented by the Examiner. As such, Applicants request withdrawal of the objection.

35 U.S.C. §112 Rejection, 1st Paragraph

Claims 1-20 were rejected under 35 U.S.C. §112, 1st paragraph. This rejection is respectfully traversed.

Applicants submit that the Examiner has not met the required burden to show that the inventor did not have possession of the claimed invention. More specifically, MPEP 2163.04 (Burden on the Examiner with Regard to the Written Description Requirement) states:

> The inquiry into whether the description requirement is met must be determined on a case-by-case basis and is a question of fact. *In*

> *re Wertheim*, 541 F.2d 257, 262, 191 USPQ 90, 96 (CCPA 1976). A description as filed is presumed to be adequate, unless or until sufficient evidence or reasoning to the contrary has been presented by the examiner to rebut the presumption. See, e.g., *In re Marzocchi*, 439 F.2d 220, 224, 169 USPQ 367, 370 (CCPA 1971). The examiner, therefore, must have a reasonable basis to challenge the adequacy of the written description. The examiner has the initial burden of presenting by a preponderance of evidence why a person skilled in the art would not recognize in an applicant's disclosure a description of the invention defined by the claims. *Wertheim*, 541 F.2d at 263, 191 USPQ at 97.
>
> **I. STATEMENT OF REJECTION REQUIREMENTS**
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> In rejecting a claim, the examiner must set forth express findings of fact which support the lack of written description conclusion (see MPEP § **2163** for examination guidelines pertaining to the written description requirement). These findings should:
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> (A) Identify the claim *>limitation(s)< at issue; and
>
> (B) Establish a *prima facie* case by providing reasons why a person skilled in the art at the time the application was filed would not have recognized that the inventor was in possession of the invention as claimed in view of the disclosure of the application as filed. A general allegation of "unpredictability in the art" is not a sufficient reason to support a rejection for lack of adequate written description. ....

In the present matter, the Examiner has identified the claim limitations at issue; however, the Examiner did not establish a prima facie case by providing any reasons. That is, the Examiner did not provide any reasons why a person of skill in the art at the time the application was filed would not have recognized that the inventors were in possession of the invention as claimed in view of the disclosure. Instead, the Examiner has merely concluded, without any reasoning, that the inventors did not have possession of the invention. This is clearly an inadequate showing and, as such, this rejection should be withdrawn.

Additionally, and despite the Examiner's failure to provide a prima facie case, Applicants submit that the inventors did have possession of the claimed invention at the time of filing of the application, and that this rejection should be withdrawn. Applicants note that MPEP 2163 states:

> To satisfy the written description requirement, a patent specification must describe the claimed invention in sufficient detail that one skilled in the art can reasonably conclude that the inventor had possession of the claimed invention. See, e.g., *Moba, B.V. v. Diamond Automation, Inc.*, 325 F.3d 1306, 1319, 66 USPQ2d 1429, 1438 (Fed. Cir. 2003); *Vas-Cath, Inc. v. Mahurkar*, 935 F.2d at 1563, 19 USPQ2d at 1116.

Additionally, MPEP 2163.02 states:

> Whenever the issue arises, the fundamental factual inquiry is whether the specification conveys with reasonable clarity to those skilled in the art that, as of the filing date sought, applicant was in possession of the invention as now claimed. See, e.g., *Vas-Cath, Inc. v. Mahurkar*, 935 F.2d 1555, 1563-64, 19 USPQ2d 1111, 1117 (Fed. Cir. 1991). .... Possession may be shown in a variety of ways including description of an actual reduction to practice, or by showing that the invention was "ready for patenting" such as by the disclosure of drawings or structural chemical formulas that show that the invention was complete, or by describing distinguishing identifying characteristics sufficient to show that the applicant was in possession of the claimed invention. See, e.g., *Pfaff v. Wells Elecs., Inc.*, 525 U.S. 55, 68, 119 S.Ct. 304, 312, 48 USPQ2d 1641, 1647 (1998); *Regents of the University of California v. Eli Lilly*, 119 F.3d 1559, 1568, 43 USPQ2d 1398, 1406 (Fed. Cir. 1997); *Amgen, Inc. v. Chugai Pharmaceutical*, 927 F.2d 1200, 1206, 18 USPQ2d 1016, 1021 (Fed. Cir. 1991) (one must define a compound by "whatever characteristics sufficiently distinguish it").
>
> The subject matter of the claim need not be described literally (i.e., using the same terms or *in haec verba*) in order for the disclosure to satisfy the description requirement. ... (Emphasis added.)

Clearly, in view of the discussion below, the inventors had possession of the invention as claimed at the time of filing of the application.

Claim 2

The Examiner is of the opinion that an "underlying material" is not described in the specification in such a manner as to show that the inventors had possession of the invention. Applicants submit that such language is clearly described in the specification.

Applicants submit that the underlying material is clearly taught in the specification as the underlying oxide layer 14 or sacrificial layer 22, in at least one embodiment. Although the exact words, i.e., underlying layer, are not specifically used in the specification, which is not necessary, it is clear from a fair reading of the specification that the inventor possessed the invention as claimed as of the date of the filing. For example, referring to paragraphs 0024, 0025 and 0026 of the publication:

> [0024] FIG. 2 shows a structure in accordance with the invention after etching processes. In particular, the chemical-block 16 and underlying oxide layer 14 are removed by a selective directional etching process. In one implementation, a standard reactive ion etching (RIE) may be used in which the resist layer 18 acts as a RIE mask. In this process, the chemical-block 16 and oxide layer 14 are etched (with the resist layer 18 acting as a mask) and then the resist layer 18 is stripped. By way of one example, a standard oxide etch based on chlorine (Cl_2) or hydrogen bromide (HBr) may be used to selectively etch the chemical-block 16. In another etching process, a fluorine-based etch may be used to etch away the oxide (SiO_2) layer 14, to the substrate 12. It should be understood that the chemical-block 16 such as Ge may be used to "firm" up the edge, which will be transferred to the $_{SiO2}$ layer as shown at E_{out}.
>
> [0025] Still referring to FIG. 2, as a result of the etching process, the chemical-block layer 16 has been patterned and now forms a capping material, referred to as a hardmask 20. Additionally, the oxide layer 14 has also been patterned with the image of the photo resist 18 forming a sacrificial layer 22.

> [0026] Referring to FIG. 3, after the hardmask 20 and the sacrificial material 22 are formed, an undercut 24 is formed in the sacrificial material 22 and beneath the hardmask 20. The edge of the hardmask 20 does not move during the undercut process, and the edge E_{out} is thus memorized for use in subsequent steps. The undercut 24 is preferably formed by a chemical oxide removal (COR); however, a buffered HF etch may also be used to form the undercut. The width of undercut 24 corresponds to the desired final well-controlled linewidth. In one implementation, the COR process provides an undercut in the range of 50 Å to 500 Å. In one embodiment, a 300 Å undercut may be provided for Semiconductor Industry roadmap 65 nm-generation processing. It should be understood, that the COR process is repeatable and, as such, the undercut can be repeated to fabricate larger dimensions. Also, other dimensions are contemplated by the invention, depending on the desired linewidth of the final structure.
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> (Emphasis added)

Claims 11, 13 and 14

The Examiner is of the opinion that the terminology "protective material" in claims 11, 13 and 14 is not described in the specification in such a manner as to show that the inventors had possession of the invention. Applicants do not agree.

Applicants submit that the protective material is clearly taught in the specification as the capping layer or hardmask 20, in at least one embodiment. Although the exact words, i.e., protective material, are not used in the specification, it is clear from a fair reading of the specification that the inventor possessed the invention as claimed as of the date of the filing. For example, referring to paragraphs 0028-0029 of the publication:

> [0028] Referring to FIG. 4, after the undercut 24 is formed, a memory material such as a nitride layer 28, for example, is conformally formed over the hardmask 20, within the undercut 24 and over the exposed substrate layer 12. The nitride layer 28 will be used as a memory material in accordance with the invention to

> pattern the critical film. And, although nitride is preferred, this material may include any suitable material, for example, polycrystalline silicon or tungsten. The material deposited underneath the overhang 26 within the undercut 24 preferably has good conformality and gap-filling properties to fully fill the undercut 24. The memory material such as the nitride may be conformally deposited using, for example, silane and ammonia, or plasma enhanced chemical vapor deposition (CVD) process. Additionally, the nitride, for example, is capable of masking the etch employed to pattern the critical film (substrate) in later processing steps as described below.
>
> [0029] In FIG. 5, a directional RIE process is used to remove selected portions (e.g., unprotected) of the nitride layer 28. This process should not remove the capping material 20, although portions of the capping material 20 may be sacrificed if the thickness of the capping material 20 remaining after RIE processing is sufficient to maintain a well-defined edge E_{out}. The directional RIE process is controlled to ensure that the edges of the material remain intact, e.g., are not eroded. The capping layer 20, during this RIE process, protects the inner edge E_{in} of the nitride layer 28 and defines the outer edge E_{out} in the nitride layer 28. Both edges E_{out} and E_{in} are thus memorized. If the edge of the capping material such as Ge is eroded during the RIE, then the edge of the nitride 28 will also be damaged, thus sacrificing the patterning of the final structure.
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> (Emphasis added)

Essential Step

The Examiner is of the opinion that the claims fail to show essential steps. Specifically, the Examiner is of the opinion that the method as claimed cannot be achieved by using the memory layer per se, but the additional steps such as the formation of the Eout and Ein using the underlying layer shown in FIGS. 3-5 are required. Applicants submit that this is merely the opinion of the Examiner, and that the steps considered essential by the Applicant are claimed. Also, Applicants are confused in the Examiner has identified the underlying layer in this portion

of the rejection, but also argues that the inventor did not have possession of this portion of the claimed invention. This appears to be contradictory.

In any event, MPEP 2172.01 states:

> **2172.01 Unclaimed Essential Matter [R-1]**
>
> A claim which omits matter disclosed to be essential to the invention as described in the specification or in other statements of record may be rejected under 35 U.S.C. 112, first paragraph, as not enabling. *In re Mayhew*, 527 F.2d 1229, 188 USPQ 356 (CCPA 1976). See also MPEP § 2164.08(c). Such essential matter may include missing elements, steps or necessary structural cooperative relationships of elements described by the applicant(s) as necessary to practice the invention.

Applicants submit that there is no disclosure, whatsoever, which mentions that the formation of the E_{out} and E_{in} using the underlying layer shown in FIGS. 3-5 is essential or necessary to practice the invention. In fact, it is clearly within Applicants discretion to determine what features are essential and which are needed. In the present matter, Applicants carefully crafted claims to recite the features which are necessary to protect the invention. These features are in the claimed invention, and there is no indication otherwise that other features are essential or required for one of skill in the art to practice the invention.

Accordingly, Applicants respectfully request that the rejection over claims 1-20 be withdrawn.

35 U.S.C. §112 Rejection, 2nd Paragraph

Claims 1-20 were rejected under 35 U.S.C. §112, 2nd paragraph. This rejection is respectfully traversed.

The Examiner is of the opinion that the terms "memorizing" and "loop of sub-lithographic well controlled image size" in claim 1 is vague and indefinite. Applicants do not agree with the Examiner. According to MPEP §2173.02, the test for definiteness under 35 U.S.C. 112, second paragraph, is whether "those skilled in the art would understand what is

claimed when the claim is read in light of the disclosure." *Orthokinetics, Inc. v. Safety Travel Chairs, Inc.*, 806 F.2d 1565, 1576, 1 USPQ2d 1081, 1088 (Fed. Cir. 1986). Definiteness of claim language must be analyzed, not in a vacuum, but in light of: (A) the content of the particular application disclosure; (B) the teachings of the prior art; and (C) the claim interpretation that would be given by one possessing the ordinary level of skill in the pertinent art at the time the invention was made.

Memorizing

The term "memorizing" is clearly defined in the specification and, as such, is not indefinite or vague. More specifically, the specification is replete with instances of memorizing and, in fact, provides at least one instance of an alternative use of the term memorizing, i.e., copy. Particularly, the following passages of the specification define, in the context of the specification, the use of memorizing.

> [0015] The invention is directed to employing non-critical lithographic techniques using a memory layer of material to memorize edges of a masking material to define a final structure having improved tolerances.
>
> [0023] The chemical-block material 16 is used to memorize or copy a first edge of the final structure as defined by a resist layer 18. The resist layer 18 is printed, imaged and patterned, on top of the chemical-block 16, leaving exposed regions of the chemical-block 16.
>
> [0026] Referring to FIG. 3, after the hardmask 20 and the sacrificial material 22 are formed, an undercut 24 is formed in the sacrificial material 22 and beneath the hardmask 20. The edge of the hardmask 20 does not move during the undercut process, and the edge E_{out} is thus memorized for use in subsequent steps. The undercut 24 is preferably formed by a chemical oxide removal (COR); however, a buffered HF etch may also be used to form the undercut. The width of undercut 24 corresponds to the desired final well-controlled linewidth. In one implementation, the COR process provides an undercut in the range of 50 Å to 500 Å. In one

> embodiment, a 300 Å undercut may be provided for Semiconductor Industry roadmap 65 nm-generation processing. It should be understood, that the COR process is repeatable and, as such, the undercut can be repeated to fabricate larger dimensions. Also, other dimensions are contemplated by the invention, depending on the desired linewidth of the final structure.
>
> [0029] In FIG. 5, a directional RIE process is used to remove selected portions (e.g., unprotected) of the nitride layer 28. This process should not remove the capping material 20, although portions of the capping material 20 may be sacrificed if the thickness of the capping material 20 remaining after RIE processing is sufficient to maintain a well-defined edge E_{out}. The directional RIE process is controlled to ensure that the edges of the material remain intact, e.g., are not eroded. The capping layer 20, during this RIE process, protects the inner edge E_{in} of the nitride layer 28 and defines the outer edge E_{out} in the nitride layer 28. Both edges E_{out} and E_{in} are thus memorized. If the edge of the capping material such as Ge is eroded during the RIE, then the edge of the nitride 28 will also be damaged, thus sacrificing the patterning of the final structure.

In view of the above, Applicants submit that the recitation "memorizing" is clear and definite when read in light of the specification.

Loop Of Sub-Lithographic Well Controlled Image Size

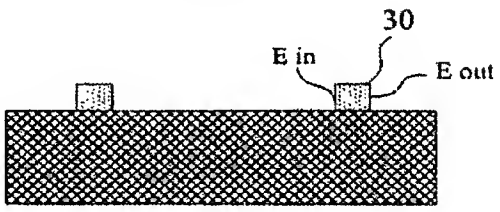
As to the terminology "loop of sub-lithographic well controlled image size", this is also clearly defined in the specification. For example, paragraph [0030] and FIG. 6 clearly describe and show this feature. Specifically, paragraph [0030] discloses:

> [0030] Still referring to FIG. 5, a germanium and oxide etch is then performed to selectively remove the capping layer 20 and the oxide layer 22, respectively. This etching process may be any standard wet chemical etching process or RIE to remove, for example, the Ge layer. One such process may include a solution of hydrogen peroxide to strip the Ge capping layer 20. This etching process results in the structure of FIG. 6; that is, the

> nitride layer within the undercut 24 remains on the substrate 12. At this end stage, there is a very well defined loop of nitride, which has a memorized inner edge E_{in} and an outer edge E_{out}. In this manner, the outside edge E_{out} corresponds to the edge of the photoresist 18 and the inner edge E_{in} corresponds to the furthest extent of the undercut, which was previously memorized.

Also, FIG. 6, reproduced below, shows the nitride loop.

FIG. 6



In view of the above, Applicants submit that the recitation the "loop of sub-lithographic well controlled image size" is clear and definite when read in light of the specification.

Memory Layer

The Examiner has noted that the memory layer in several claims lack antecedent basis. Applicants have amended claim 1 in order to address this issue.

Different Embodiments

The Examiner correctly notes that the specification covers many different embodiments. However, the Examiner is of the opinion that

> the invention as claimed are confused and fails to directed [sic] to each embodiment that applicants regard as their invention. The language provided in the claims are not clearly corresponding to the steps or terminology provided in the written description.

Applicants submit that the claims are not "confused" and that Applicants are free to claim any desired embodiment. Simply, there is no requirement, whatsoever, that Applicants be bound to any single embodiment. In fact, the MPEP notes that an application may include claims directed to more than one embodiment. Specifically, MPEP 806.04 states, in part:

> Where an application includes claims directed to different embodiments or species that could fall within the scope of a generic claim, restriction between the species may be proper if the species are independent or distinct.

MPEP 806.04(e) states, in part:

> Claims are definitions >or descriptions< of inventions. *Claims >themselves< are never species*. The scope of a claim may be limited to a single disclosed embodiment (i.e., a single species, and thus be designated a *specific species claim*)*>. Alternatively,< a claim may *>encompass< two or more of the disclosed embodiments** (and thus be designated *a generic or genus claim). (Emphasis Added.)*

Also, Applicants submit that each of the claims are clearly directed to certain embodiments, albeit some claims may be generic to different embodiments. Also, none of the claims are improperly dependent on a claim of a different species. Also, Applicants note that the Examiner has not provided any specific claims which might be incorrectly dependent on different embodiments and, to the best of Applicants knowledge, there is no confusion. If the Examiner is to maintain this portion of the rejection, Applicants respectfully submit that the Examiner clarify which specific claims and claim language are confusing so that Applicants can consider such rejection.

Additionally, Applicants note that there is no requirement, whatsoever, that the steps or terminology used in the claims correspond exactly to the steps or terminology provided in the written description. In fact, the MPEP 2173.01 clearly states:

> In reviewing a claim for compliance with 35 U.S.C. **112**, second paragraph, the examiner must consider the claim as a whole to determine whether the claim apprises one of ordinary skill in the art of its scope and, therefore, serves the notice function required by 35 U.S.C. **112**, second paragraph, by providing clear warning to others as to what constitutes infringement of the patent. ....
>
> Accordingly, a claim term that is not used or defined in the specification is not indefinite if the meaning of the claim term is discernible. *Bancorp Services, L.L.C. v. Hartford Life Ins. Co.*, 359 F.3d 1367, 1372, 69 USPQ2d 1996, 1999-2000 (Fed. Cir. 2004) (holding that the disputed claim term "surrender value protected investment credits" which was not defined or used in the specification was discernible and hence not indefinite because "the components of the term have well recognized meanings, which allow the reader to infer the meaning of the entire phrase with reasonable confidence").

Applicants submit that the claim language is clear and discernable and that one of ordinary skill in the art would understand the language of the claims. As discussed in detail above, the claim language finds support in the specification, although exact terminology may not be used entirely throughout the specification with the claims. In any event, there is a clear support for the claim language in the specification and one of skill in the art can clearly discern the metes and bounds of the invention.

CONCLUSION

In view of the foregoing amendments and remarks, Applicants submit that all of the claims are patentably distinct from the prior art of record and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue. The Examiner is invited to contact the undersigned at the telephone number listed below, if needed. Applicant hereby makes a written conditional petition for extension of time, if required. Please charge any deficiencies and credit any overpayment of fees to Attorney's Deposit Account No. 09-0456.

Respectfully submitted,

Andrew M. Calderon
Registration No. 38,093

Greenblum & Bernstein, P.L.C.
1950 Roland Clarke Place
Reston, Virginia 20191
Telephone: 703-716-1191
Facsimile: 703-716-1180